

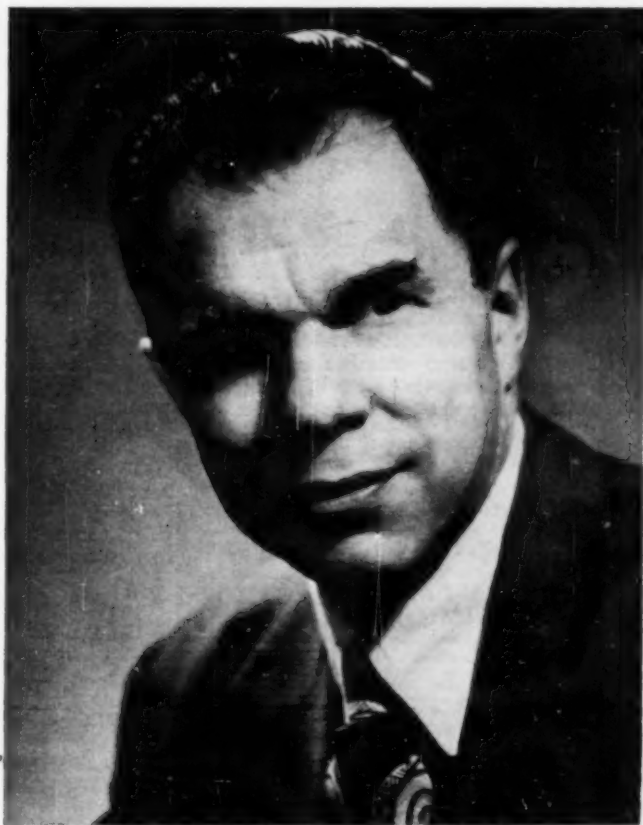
# THE CHEMIST

December 1952



VOLUME XXIX

NUMBER 12



**DR. GLENN T. SEABORG, F.A.I.C.**

*Awarded Honorary AIC Membership  
(See page 585)*



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- Safety and Hygiene in the Use of Radioisotopes, by John C. Pennock
- Industrial Problems in Skin Cancer, by Dr. Ernest L. Wynder
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## EDITORIAL

### The Charles Lathrop Parsons Award

*Dr. Walter J. Murphy, Hon. AIC., Editor,  
The American Chemical Society, Washington 6, D. C.*

EVERY chemist and chemical engineer here and abroad will rejoice in the action of the Board of Directors of the American Chemical Society in establishing the Charles Lathrop Parsons Award. No member of the profession more richly deserves recognition by the American Chemical Society and the chemists and chemical engineers of this country, than does the man who served as secretary of the Society for thirty-nine years.

The Parsons Award will be given no more than once every three years to a chemist or chemical engineer for "outstanding public service." The recipient of the award will receive a scroll and the privilege of choosing the recipient of a \$2,000 graduate scholarship.

It is most fitting that Dr. Parsons be the first to receive the award created to honor him.

Dr. Parsons has performed many outstanding public services. Largely through his efforts the Chemical Warfare Service was organized in World War I. His scientific and technical talents were employed by the United States Government on many occasions, perhaps the most important being his visit to Europe just prior to the United States' entrance into

World War I to investigate and report on the latest methods on nitrogen fixation. Later when America became involved in the war, Dr. Parsons played a prominent role in the nitrogen fixation program which culminated in the building of Muscle Shoals.

Dr. Parsons' courage in battling for draft deferment of chemists and chemical engineers needed in the "production army" is well known to each and every member of the profession.

The scroll presented to Dr. Parsons particularly mentions his courage, leadership, zeal, and public service, and then goes on to say:



"These are attributes which characterize the life and works of Charles Lathrop Parsons, whose outstanding talents during his long and fruitful life have been dedicated to serving American chemists and chemical engineers, to building their science to new heights of achievement, and to creating and expanding an industry built on those men and that science. The strengthening of his country was his ultimate goal, and his beloved American Chemical Society was the chosen instrument employed."

The establishment of the Charles Lathrop Parsons Award is not just another award given periodically to a distinguished chemist or chemical engineer. It is a symbol. While it will provide training for only one poten-

tial scientist at a time, it focuses attention on the benefits to be derived from a continuing and successful science. It also calls attention to the fact that at all times we must maintain an adequate supply of qualified scientific manpower. The award very happily points up something else of importance—the public service role of

the chemical profession. It also serves to emphasize what scientists can accomplish in a collective action working through a scientific society.

Dr. Parsons is an honorary member of THE AMERICAN INSTITUTE OF CHEMISTS. Every member of the AIC is most happy that the ACS has chosen to honor "Mr. Chemistry."



## *Christmas Greetings*

The Christmas Season reaffirms man's faith in the goodness of his fellows. It touches the hearts of men and makes it clear that happiness is not found in the pursuit of material things.

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# Nuclear Energy for Industry

**Dr. Glenn T. Seaborg, Hon. AIC.**

*Professor of Chemistry, University of California, Berkeley, Calif.  
Nobel Laureate.*

(Acceptance address when Honorary AIC Membership was presented to him, September 25th, at a meeting of the Los Angeles AIC Chapter, Los Angeles, Calif.)

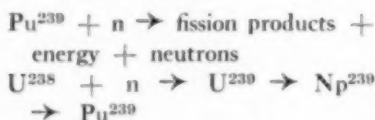
IT IS fortunately a characteristic of the nuclear chain reaction operating on fissionable material that tremendous amounts of energy can be released in a slow controlled fashion as well as instantaneously as is the case for the nuclear weapons. Just the same amounts of energy, which captured the imagination of so many people when the nuclear weapons were first exploded, can be released under controlled conditions in nuclear energy machines or reactors or piles as they sometimes are called.

There are three potential fuels for such nuclear energy machines, the three fissionable isotopes  $U^{235}$ ,  $Pu^{239}$ , and  $U^{233}$ . The first of these is produced by the method of isotope separation in plants of the type which are in operation in Oak Ridge, Tennessee, and the second is produced by the absorption of neutrons in  $U^{238}$  according to the reaction  $U^{238} + n \rightarrow U^{239} \rightarrow Np^{239} \rightarrow Pu^{239}$  in the production plants of the type in operation at Hanford, Washington. The neutrons are produced from the fission of the  $U^{235}$  which is present in small amount (0.7 per cent by weight) in natural uranium. The

isotope  $U^{233}$  is produced by the absorption of neutrons in  $Th^{232}$  according to the reaction  $Th^{232} + n \rightarrow Th^{233} \rightarrow Pa^{233} \rightarrow U^{233}$ . The fissionable isotope  $U^{233}$  can be produced in quantity only by irradiating thorium with neutrons in conjunction with a chain reactor operating on one or another of the three nuclear fuels,  $U^{235}$ ,  $Pu^{239}$ , or  $U^{233}$ . It is of interest to note that the element thorium itself consists of only the one isotope  $Th^{232}$  in macroscopic quantities and thus, since this isotope is not readily fissionable, the element thorium cannot sustain a chain reaction as is the case for the natural mixture of isotopes in uranium.

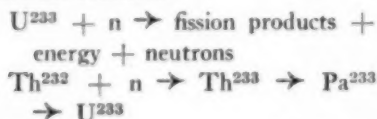
Thus it can be seen that although  $U^{235}$  is the only natural occurring fissionable substance, it is possible to burn indirectly the more abundant isotope  $U^{238}$  by means of its intermediate conversion to fissionable  $Pu^{239}$ . This means that the potential amount of nuclear fuel is considerably larger than that which corresponds to the rare isotope  $U^{235}$ . There exists the interesting possibility after the accumulation of a sufficient amount of  $Pu^{239}$  so that it may be

used to operate chain reactors, to produce more  $\text{Pu}^{239}$  by the absorption of the excess neutrons in  $\text{U}^{238}$ . The reactions would be as follows:



If it should prove possible to produce more  $\text{Pu}^{239}$  according to the second reaction, than is consumed in the same time by the first, we should have the possibility of "breeding"  $\text{Pu}^{239}$ , or, in other words, of making available all of the uranium as nuclear fuel, and not just the small amount of  $\text{U}^{235}$ . This would have the effect of multiplying one-hundred-fold the amount of energy which can be realized from uranium.

The same breeding possibility exists in principle with respect to the thorium —  $\text{U}^{233}$  pair. Here we would have the reactions



If it should prove possible to produce more  $\text{U}^{233}$  according to the second of these reactions than is consumed in the same time according to the first, it would be possible to use all the thorium as a nuclear fuel. It is because of the possibility of utilizing, at least in part, the nuclear energy of thorium indirectly through its conversion to fissionable  $\text{U}^{233}$  that the element thorium is subject to the

same controls in its mining and processing as is uranium.

### Sources

It is of interest to include a few words about the sources of these important elements uranium and thorium, through which the "big three" of nuclear fuels,  $\text{U}^{235}$ ,  $\text{Pu}^{239}$ , and  $\text{U}^{233}$  are derived.

Uranium and thorium are widely distributed in nature. The best available estimate of the average uranium content of the earth's crust is  $4 \times 10^{-6}$  grams of thorium per gram of rock, while that for thorium is about  $12 \times 10^{-6}$  grams of uranium per gram of rock. Thus the earth's crust consists of 16 parts per million of potentially fissionable material, and if one takes into account the factor of about  $2.5 \times 10^{-6}$  greater heat energy equivalent of fissionable material as compared to an equal weight of coal, one finds that one ton of earth's crust has an energy content from this source equivalent to some 40 tons of coal.

However, this is a gross oversimplification! This ignores the question of economics. The proportion of the uranium and thorium on the earth which lies in relatively rich ore deposits is rather small. However, recent statements issued by the U. S. Atomic Energy Commission indicate that more and more usable deposits are being found so that there seem to be good reasons for being optimistic in respect to the general problem of the basic raw material for the produc-

## NUCLEAR ENERGY . . .

tion of fissionable isotopes. It is beyond the scope of this discussion to go into this matter in greater detail, and the previously mentioned considerations only serve to illustrate the ultimate potential under ideal conditions which may never be realized.

There are a great number of very difficult scientific and engineering problems that must be solved before a nuclear energy industry can be fully developed. An attempt will be made to indicate very briefly the nature of some of these problems.

### Structural Materials

There is first of all the problem of the materials of construction including the fuel, the moderator (the material for slowing down the neutrons), and the structural members for holding the reactor together. The nuclear fuel must somehow be put in a form where large amounts of heat can be removed while at the same time its physical form, upon which continued operation of the reactor depends, is not destroyed. The moderator, which is to be made from light elements such as deuterium, beryllium, carbon, etc., must be prepared very pure so as not to absorb too many neutrons and must somehow be able to withstand the high temperature and the radiation. The structural materials must be made to meet conditions that have hitherto never been encountered in structural engineering, since they must be carefully selected on the basis of their nuclear properties as well as

their mechanical properties. In particular they must have as low an affinity for capturing neutrons as possible, and this indispensable requirement may not easily be made consistent with structural strength and resistance to radiation and corrosion. For example, the unfamiliar element zirconium seems to meet these difficult conditions satisfactorily but in order to even test its possible use a source must be developed all the way from the mine through purification, metallurgy and final fabrication.

### Heat and Radiation

Since the piles must operate at high temperature in order that there might be good efficiency for the conversion of the heat energy to the useful form of electrical energy and since intense radiation will be present, the problems which are posed are very formidable indeed. It is interesting to note how many of these problems fall into the domain of the chemist, metallurgist, and chemical engineer. In fact, it is fair to say that the crucial problems fall under the area of these disciplines and that the future of nuclear energy in industry will stand or fall on the question of their successful solution. In this connection it should be emphasized that the present shortage of manpower in these fields, and especially the much greater impending deficiency in the available number of such scientists and engineers, will have a substantial effect in lengthening the time schedule of this develop-

ment beyond that which might have prevailed under the situation of a more ideal supply.

One of the knottiest problems of pile construction is that of the removal and utilization of the heat energy, the primary form in which the energy appears. Such materials as permanent gases, which have some advantages in handling but have low heat capacities, and even molten metals which have high heat capacities but are difficult to handle, come to mind. One is again faced with the necessity of considering only such coolants as have the proper nuclear properties. In connection with the coolant, there is, of course, the problem of possible reaction with the nuclear fuel, and in order to prevent this, it may be necessary to place the latter in a jacket. In any case, there has to be considered the corrosive and erosive action of the coolant, effects which are considerably irritated by the presence of intense radiation. The fluid containing the heat energy can be used to operate a turbine which would in turn transfer its energy to an electric generator and thus the heat energy can be converted to a form which is generally useful for electrical and mechanical power.

Another component of a reactor is the control system, the mechanism which allows the machine to be turned on or off and which keeps it at the desired operating level without either dying or running away. The

reactor control system operates on the simple principle of draining off neutrons by absorption. Thus there must be extremely reliable mechanisms for inserting and withdrawing such control rods, and therefore the development of essentially 100 per cent fool-proof apparatus is paramount here.

The radiation emanating from a pile operating at a high power level is, of course, of extremely high intensity. There are the neutrons, which escape from the surface, and the gamma-rays which emanate from the nuclear reactions which take place in the uranium and attendant materials and from the fission products. This amounts to a staggering level of radiation, unheard of in previous experience, and the whole of the power-pile must therefore be enclosed in very thick walls of concrete, steel or other absorbing material. This shielding material must be constructed in a manner which is consistent with the loading and unloading of the pile and in such a manner as to make it possible to carry the coolant in and out. The shields must not only be radiation-tight but possibly also airtight, since air exposed to the radiation of the pile would become radioactive.

### **Chemical Processing**

There is also the large problem of the chemical processing. It will be necessary from time to time to remove the "clinkers," that is, the fission products, by reprocessing the fis-

## NUCLEAR ENERGY . . .

sionable material. For each different type of pile or mode of operation a chemical extraction process tailored to suit the situation will be required. The success or failure of the breeding process will depend in large measure on the solution of this problem since in this case the repetitive nature of the chemical separation procedures demand an almost fabulously high recovery yield in each of the many chemical cycles required in the course of a single turnover of the fuel material. The radiation dangers which require shielding in the pile are present in a large part in the chemical separation plant. Perhaps the most difficult problem of all is the question of how to dispose of these highly radioactive wastes.

The U. S. Atomic Energy Commission has an extensive and vigorous program of reactor development under way. Reactors which are directed toward ultimate utilization as industrial power plants are under active investigation, although in several instances these will have their first application in the military field. Three broad types under investigation utilize slow neutrons, intermediate energy neutrons, and fast neutrons in the perpetuation of the basic chain reaction with some emphasizing the breeding aspect, some the power aspect, and some both aspects; these, of course, are in addition to the reactors which are being developed solely for im-

proved production of fissionable material.

The research work connected with these developments is carried on in a number of the Atomic Energy Commission's large laboratories, while the final construction and testing is often carried on at the National Reactor Testing Station near Arco, Idaho; of great importance for the whole program is the high neutron flux Materials Testing Reactor which recently went into operation at Arco.

### Plutonium Manufacture

Of particular importance to the future of nuclear energy in the field of industrial power is the potential program of greater participation of industry in plutonium manufacture which is being explored with the Atomic Energy Commission by a number of industrial firms. Under exploration is the possibility of plutonium manufacture by American industry under an arrangement where the raw material uranium is borrowed from the government, the product plutonium sold to the government with the concomitant utilization of the attendant power generated in the production process by the firm involved. Among the companies involved in this feasibility investigation are Pacific Gas and Electric Company and Bechtel Corporation in California. Central to progress here is the problem of lessening the secrecy in the program and the Atomic Energy Commission is apparently taking

the necessary steps to accomplish this since a re-evaluation of the situation in the light of the changed conditions of today seems to point to a great desirability for such a modification.

### **Power Applications**

The nuclear energy is developed as heat energy, of course, and may be used in this form but, as already mentioned, it is probable that it will usually be converted to the electrical form by more or less conventional means. Because of the shielding requirements the atomic energy plants of necessity will be associated with a great bulk and weight of material and, therefore, will be better suited to stationary structures, at least at first. Thus the earliest uses could profitably be in isolated regions where there is a need for additional power. It is planned, however, to develop such machines for mobile vehicles where the limitations on space and weight are not too stringent. Thus nuclear power plants for large ships and submarines are under construction through Atomic Energy Commission contracts with such firms as the Westinghouse Company and the General Electric Company and these may be the first practical large scale uses of nuclear energy serving as forerunners to its application in industry. It is also probably not out of the question that such power plants might be used for the propulsion of very large airplanes which are being planned for the future, but this is

admittedly a longer range problem. There has been, of course, much discussion in regard to the possibility of applying this form of energy as a motivating power for rockets and guided missiles. It does not seem that it will ever be possible to use this source of energy for the propulsion of ordinary automobiles or even locomotives.

These considerations of the difficult problems which must be solved before an atomic energy development can be accomplished should be of some aid in helping us to make some guesses with respect to the time scale. It should be emphasized that these considerations can be regarded as little more than guesses. A first step, namely that of operating small electrical generators or furnishing the energy directly for the small scale heating of buildings, has already been taken at Arco, Idaho, and at the Atomic Energy Research Establishment in Harwell, England. It should perhaps be possible within the next decade to develop and build a power plant which produces useful energy on a scale of some hundreds of thousands of kilowatts. Although continued development to the stature of large industry will be technically feasible, its actual development will be subject to political and economic considerations. Should it prove feasible to go ahead, as seems possible from the standpoint of the technical problems alone, it does not seem pos-

## NUCLEAR ENERGY . . .

sible to build up a nuclear energy industry of such proportions that any appreciable fraction of the world's energy production is produced in this manner before several decades.

Although some estimates as to the cost of producing nuclear power have been made, it does not seem possible to make any very sensible statements on this point at the present time. Important to this matter is the question of ore supply and whether or not breeding will be successful. It is not out of the question that the nuclear source will eventually compete economically with coal as a source of energy, but it is also

quite possible that this will never be the case except for localities where the price of coal is very high due to transportation difficulties.

Even should the nuclear source never provide cheaper energy than the present common sources, it may still have an important future because of its advantages as a compact and almost inexhaustible source of energy, characteristics which give it advantages which no other fuel can come close to equalling, advantages which cannot be evaluated in terms of dollar value because there is no alternate way of accomplishing the same things at any price.

## Glenn T. Seaborg

Dr. L. F. Pierce, F.A.I.C.

*L. F. Pierce Laboratories, 2007 Wilshire Boulevard, Los Angeles 5, Calif*  
(Presented at the meeting of the Los Angeles Chapter when Dr. Seaborg received Honorary AIC Membership).

**G**LENN Theodore Seaborg was born in Ishpeming, Michigan, in April of 1912. He was of Swedish stock. In 1922 the family moved to California to an area which is now in the corporate limits of South Gate. The family live there to this day. He was graduated from David Starr Jordan High School in 1929 and even then displayed a profound interest in chemistry and physics.

His early years are revealing. He delivered papers, mowed lawns and did various odd jobs for his spending money. On graduation from high

school, his first job was that of warehouse stevedore. Next came night helper's job in a laboratory of Firestone. His following summer was spent first as a fruit picker in the San Joaquin Valley and then as a cleaner and oiler of linotypes in a local newspaper plant. After that, his best source of income was from his activities as a laboratory assistant in the chemistry department of the University of California. Enough time was spent in making his way economically that he was not graduated from UCLA until 1934. A search of the record fails to

show that he spent time in the CCC or that he benefited from WPA. No use of the term "under-privileged" appears in the record and there seems grave doubt that he did or would understand the term. Thorough appreciation of the Conservation Laws is not consonant with devotion to the "something for nothing" ideal.

In 1937, the University of California conferred upon him the Ph.D degree, involving a thesis on the inelastic scattering of fast neutrons. After two years as assistant to G. N. Lewis, he became an instructor in chemistry and in 1941, assistant professor. The papers of himself and his group number some forty and the isotopes discovered numbered in dozens during this time. The high spot of that era was the discovery of Plutonium in 1940. It was the first synthetic element and of its isotopes, one was fissionable, and thus it was here that the lid of Pandora's box first began to loosen.

There is no recorded case of scientific greatness coming to any man after the age of thirty years. It has been recognized for the first time after the age of thirty years, but investigation always reveals that the man did work of such validity which entitled him to the rating, before passing his thirtieth year, even though it might not have been recognized as such until later. Thus it is clear that the claim to scientific greatness was spiked down irrevocably in this instance.

Seaborg went to the Chicago Metallurgical Laboratory of the University with a group of co-workers in April of 1942 and remained until May of 1946. In addition to the primary work of this period, two more elements were filled in: Americium and Curium. The University of California also moved him to full professor in 1945. On his return to UC, he has engaged in departmental duties and directs the chemical research in the Radiation Laboratory. Two more elements, Berkelium and Californium, have entered the scene. In 1951, the Nobel prize was split between Seaborg and McMillan. Publications have entered well into the second hundred, and the Law of Probability tries to tell us that his career will now tend to level off as this new framework of achievement is blocked in, pointed up, and brought to where man learns how to live with it — if he can!

It is oddly fitting that this meeting takes place and this award be made so close to the spot where Thomas Hunt Morgan did his monumental work on genetic mutations of fruit flies as caused by hard radiation. Consideration of that work enables us to have at least a beginning comprehension of the content of Pandora's Box which has been dumped upon the world. As we meditate, we appreciate that the farther man is from sheer brute, the more precisely he begins to realize the awful burden on his soul. Full comprehension of that burden cannot come before about ten cen-

turies. What man collectively and individually will do with his problems—and his guilt—will be a story of interest and fascination. To those dedicated to serve truth, which is merely another way of saying God, it is depressing to contemplate our present fog of bombast, untruth, strife for power, appeals to the cheapest of selfishness and finally of a conquest more vile than the wildest dream of Genghis Khan.

With things as they are, Dr. Seaborg can only plow the scientific field to a limited depth here tonight. But he must be sure that we will listen with keen interest and close attention for it is sure that he can, from his factual knowledge and with his fine intellect, draw certain conclusions and present them for our sober consideration and cogitation.

Most men plod through life. Dr.

Seaborg has lived for some years of great ferment, excitement and even crisis. But to finish an edifice is just sheer, hard, plodding work. The garden about his new house tells him some of that. His four children will tell him more as time goes on. He will remain a most productive and inspiring scholar. But one day he will begin to really feel the creative joy of working with the minds of others. And one day he will wonder if God is going to be good enough to grant to him too, a student who will far surpass the professor. Let us most devoutly pray that this final joy be granted him.

Dr. Work, permit me to present for the award of Honorary Membership in *The American Institute of Chemists*, Dr. Glenn Theodore Seaborg.

## Presentation of Honorary AIC Membership to Dr. Seaborg

**I**N an atmosphere of warm welcome and hospitality typical of the West, Dr. Glenn T. Seaborg, Nobel laureate, professor of chemistry, University of California, was presented with Honorary AIC Membership at a meeting of the Los Angeles AIC Chapter, held at the University Club, Los Angeles, Calif., on September 25th.

T. F. Bewley, of the Braun Corporation, chairman of the Chapter,

presided. Dr. L. F. Pierce, of the L. F. Pierce Laboratories, introduced the national AIC president, Dr. Lincoln T. Work, who spoke on "A Streamlined Set of Objectives and Aims of the AIC." (See page 594). The Chapter's chairman-elect, Peter J. Stupin of Calavo, Inc., announced the program for the December fourth meeting.

Dr. Pierce introduced Dr. William Crowell, professor emeritus of the

University of California, who spoke extemporaneously on "Dr. Seaborg as a Student and Teaching Associate at U.C.L.A." Dr. Pierce followed this talk with a brief biographical sketch of Dr. Seaborg (see page 591). Dr. Work then presented the certificate of Honorary Membership to Dr. Seaborg, who addressed the meeting on "Nuclear Energy for Industry." (See page 585).

The citation to Dr. Seaborg reads:

*Outstanding nuclear chemist and Nobel Laureate, who not only through his own research, but through the teaching, inspiration and leadership of the research of others, contributed to the advancement of human knowledge, and by his personal and technical contributions has elevated the profession of chemist in the eyes of the world.*

## A Streamlined Set of Objectives of the AIC

**Dr. Lincoln T. Work, F.A.I.C.**

*President, The American Institute of Chemists*

(Presented at the dinner meeting to honor Dr. Glenn T. Seaborg, held by The Los Angeles Chapter, AIC, September 25th, in Los Angeles, Cal.)

**I**T is not often possible for a president of The American Institute of Chemists to be with you; but it gives me a great satisfaction that on this occasion I could join with you in honoring Dr. Seaborg. This is a growing region; it offers a warm and friendly welcome; it esteems honor and integrity. It is a good climate for a profession to flourish and give dignity to the chemist. The evidence of your response to these forces is to be seen in this very active chapter. Distances being what they are we may well hope that other west coast areas will see the merit in organizing for the meeting of professional minds.

You no doubt wish to hear more about your Institute, the primary purpose of which is to serve the pro-

fessional interests of chemists and chemical engineers. It has many facets:

- (1) The education of the chemist.
- (2) Adaptation of the young chemist to a professional career.
- (3) Personal advancements and placement.
- (4) Knowledge of technical trends.
- (5) Manpower in industry, in teaching, and in government—both as civilians and military personnel.
- (6) Legislation affecting chemists.
- (7) The patent law, and the protection of rights for contributions made.

### ... OBJECTIVES

In all of these the INSTITUTE has served. One of its most notable contributions was to the Chemists Unemployment Committee which served during the thirties to place men in useful positions and to preserve human dignity.

From small beginnings only a quarter of a century ago, it has grown to a membership of 2,500; and with that growth there has come strong participation by outstanding leaders of the profession. There are many more who ought to join with us in this work of giving to the profession rather than merely getting something from it. Its size is now such that its operations need to be tailored to its new position. This means organization and teamwork more than ever before. When you read in *THE CHEMIST* the list of committees, you will see how the service of the organization is being enlarged and how broad is its coverage. More advertising in *THE CHEMIST*, a thorough-

going membership solicitation program, and the New York Chapter's employment committee program, are aspects of this effort. The other major aspect of growth is greater chapter activity. Much of the professional service is personal and is best done at the local level. Even small chapters can do a real service in their own backyards. They can feed to the national society their observations of trends, which can thus be more broadly integrated. One objective of the officers and council is to give support to the local groups, through general advice, national actions, and with more financial support to carry out their programs. Given a little time, all of these goals can be met. But still, we aim to keep our objectives up-to-date through further study.

This is but a brief story of the efforts we all may make toward a better profession which in turn will do its part to make a better America.

## Intreduction of the President of the American Institute of Chemists

**I**N December of 1898, in Hartford, Connecticut, was born a male child, Lincoln T. Work. In 1918 Columbia conferred upon him the A.B.; in 1921 the Ch. E.; the A.M. in 1924, and the Ph.D. in 1929. In 1922 he married and from that union issued two daughters.

During a period of nineteen years,

he was first instructor and then associate professor at Columbia and worked as a consulting chemical engineer. A decade as director of research and development for Metal & Thermit Corp. of New Jersey followed. Since, he has practiced from New York as a consulting chemical engineer with notable success.

His total of published papers has passed the 65-mark. His membership in learned and professional societies is most impressive and the record of his official service to such, is even more so. His interests far surpass the purely scientific and technical. And it is of significant interest to note that he gives no evidence whatsoever of having fallen victim to the popular modern heresy — which was well-recognized in Rome at the time of Alaric — of devotion to the "virtue" of being an intellectual. It must be borne in mind that an intellectual is

one who confuses ideas with men and things.

Thus when he became President of The American Institute Of Chemists, one more logical step was taken by that organization in the achievement of their forthright program. So you see, we are fortunate in being able to hear and see the man on the bridge of that chemical craft which sails bravely under what seems to the weak and the slothful as virtually letters of marque and reprisal. He will tell us something of what the job has been, what it is and what is to be done as time goes on.

## **Introduction of Dr. William R. Crowell**

### **Dr. L. F. Pierce, F.A.I.C.**

(Presented at the meeting of the Los Angeles Chapter to honor Dr. Seaborg).

**M**ANY are called but few are chosen!

An early discovery of the introspective and intellectually competent teacher is the Law of Probability. If he examines it sufficiently, he is exposed to certain truths, many of an unpleasant nature. His reaction is a true measure of the man.

Probably the most disturbing revelation is that the discoverer may fundamentally be a journeyman holding few or none of the seeds of greatness in him, and that his talents and preferences are those of the teacher well able to plant and cultivate the precious seeds of truth competently and so to develop the genius of youth

who come to him. At this fork of the road, he must choose. Shall he take an idea or concept and try to build them to a theory or even a "great" contribution and devote the rest of his life to a frantic and sometimes necessarily savage defense of it? Or shall he face fact that the stuff of obvious greatness is not for him and his path lies along the development of competence and a truly monastic service of truth?

Does that service have any reward. Let us look at this a moment. The rarest plant, the most exquisite flower cannot bloom without a favorable climate and for complete revelation of genetic potentiality, that climate

## INTRODUCTION . . .

must be man-made. Thus the academic who chose the rougher and less glamorous road at the fork, discovers that if God sees fit, he has a part in the development of a better man than he could ever have hoped to be. He has a hand in the growth, development, encouragement of a goodly number of fine and able ones. He cuffs them about, that they may learn to stand on their own feet and that they learn the lesson of serving truth and they too come to be competent journeymen and as is proper, of greater competence than he. Such is evolution. It is what this world can be at the best.

Your next speaker is such a one. He first saw light in Massachusetts in June of 1879. He settled in Los Angeles before the turn of the century and was graduated from Los Angeles High School in 1900. M.I.T. conferred the baccalaureate degree on him in electrochemistry in 1904, and Columbia, the Ph.D. in Chem. Eng. in 1916. After a couple of years in industry, he moved permanently into the academic groves. Most of those years were at UCLA where he rose to full professor and became emeritus in 1948. Over the years he did his full share of teaching, aiding the pruning of academic sprouts. He was given the truly rare privilege of having at least one student who was not only just good but was instead one of those marked for real greatness. And so you see, in the aid and encouragement and stimulation of the

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great one, our brother journeyman too, rises to his proper place in the sun. This is the glory that may well lie at the end of the rough road of little glamour.

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**Expansion:** Goodyear Tire and Rubber Company announces plans for a \$1,500,000 expansion program for its chemical division, in the field of synthetic rubber.

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**Appointed:** Richard C. Schleck as director of the Reagent Chemical Sales Division of Fisher Scientific Company, 717 Forbes St., Pittsburgh 19, Pa.

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**Appointed:** Sterling Advertising Agency, New York 17, N. Y., as advertising counsel for Dexter Chemical Corporation.

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**Exhibit:** "The Story of Steel," opened by The Franklin Institute, Benjamin Franklin Parkway at 20th Street, Philadelphia 3, Pa.

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# The Orientation of Research Activities

Raymond Stevens, F.A.I.C.

*Vice President, Arthur D. Little, Inc., 30 Memorial Drive,  
Cambridge, Massachusetts*

(Presented at the AIC Annual Meeting, May 8th, as part of concurrent Session D, "Employer-Employee Relations.")

THE productivity of industrial research can only be measured by results obtained over relatively long periods of time. It is, therefore difficult to evaluate methods of increasing research productivity. Methods and practices designed to keep the effort of a research staff concentrated effectively on a designated commercial objective are no exception.

Some elements of this subject are too involved for constructive discussion in a short talk — involved with the psychology of incentives, the selection and training of personnel, the maintenance of morale, for example. Many of us have experience with these elements, and perhaps have theories based on that experience, but most of them are still in the realm of the art rather than the science of research management. The answer to the proper use of such elements of the art of research management is simple — find a research leader who has demonstrated his skill, and back him.

It may be constructive, however, to comment briefly on one or two points out of the experience of one laboratory that has been reasonably

successful over a period of years. Many of the managerial practices have been developed by trial and error, in an atmosphere originally of great freedom, in which competent men in a small group were allowed to work out their own methods and practices of attaining research objectives within closely limited budgets of time and money. The methods that succeeded gradually developed into a pattern of practice, portions of which can be defined. Some of them have been found to be helpful in other research management situations.

It has been said many times that research is not *directed*. But if it is to be successful, and if it is not to be directed, then all the research workers above the point where the routine aspect of the work *is* directed, must come directly in touch with the management thinking and policy. If it is not to be *directed*, then the problem cannot at best be relayed through another research "director," but the research worker should preferably be exposed directly to the management thinking and the personnel on the top management or on the sales or operating side who present the problem

or the opportunity for research attack.

This approach is diametrically opposed to the principles of the line organization — the usual industrial and military type of organization where orders, instructions and information must all pass from the top man down through the pyramid to the corporal whose squad carries out his portion of the defined objective.

The type of research or development organizational plan for most effective results depends in part upon the degree to which creative, inventive contribution is essential to success. Engineering and certain types of "development" work can be clearly specified in advance and the various elements delegated through a line organization, from the top layer of direction through the various minor executives to the drafting board, pilot plant and shop. Where creative work is expected the line organization interferes or breaks down. Largely by trial and error our own laboratories long ago adopted the project plan of attacking individual research assignments, with a project director personally responsible to the laboratory management and to the sponsor for the success of the assignment. A team is assembled under his supervision, a team drawn for ability to contribute, and in general independent of line organization location. This project leader, and frequently his associates, participate directly with the sponsor in the formulation and definition of the

problem before the leader accepts the responsibility of the project.

Insofar as possible the project leader and the sponsor get together and keep together in agreement on a definition of the assignment and on its necessary modification as the project advances and the information gained permits a better understanding of possibilities and limitations. Insofar as the project leader can absorb the point of view and the desires of the sponsor, can absorb some of his enthusiasm for the end objective, he can improve the efficiency of the attack.

This element of the communication problem in the efficient conduct of research toward a commercial objective has been developed fairly well. With the project system, with the project leader in direct communication with the "customer" for the project, there is little difficulty in keeping project and project workers "on the beam."

Another communications problem incident to efficient, successful, creative industrial research has not been so well advanced. That is the problem of making sure that the research workers in a team use all the help that is available to them, and in particular the assistance of the best qualified, highly competent scientists. The best men for driving to a defined industrial objective are not always the best fundamental scientists. Yet the project may need all that the latest

advances in basic science can give it. It is important that the laboratory management know that the possibility of drawing upon the best of science resources has been considered and if the background point of view and co-operation of top level scientists are needed, that they are supplied.

### **The Science Director**

Arthur D. Little, Inc. has adopted a new approach to this problem in the appointment by its president of a science director with an associated staff of scientists well qualified in several principal areas of physical science, chemistry, physics, physical chemistry.

In a line organization the research director would, in theory, follow all projects, and see that each receives assistance and that each uses intellectual help that is available to him. I say in theory, because in a modern research laboratory of any size and complexity it is mentally impossible for a research director, or in the larger laboratories, even for a research director and his immediate subordinates, to be familiar with the science and technology and the commercial aspects of any major portion of the problems in his organization. In a few rather narrow fields of specialized knowledge, electronics or branches of chemical manufacture perhaps, or mechanical devices, this approach is still attempted, but it possibly can be restricting and limiting to the pro-

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ductivity of the research department for the management to expect such omniscience of its research director, or worse, for him to pretend to have it.

Note especially that this is a staff rather than a line position. The title "Science Director" was chosen with care. He does not direct scientists, but is responsible for the caliber of the science they use, responsible in an advisory, staff capacity directly to the top management of the organization. He has the right and the responsibility to delve into any and all research activity, to read reports, to check on the capacity of individuals assigned, to participate in discussions pertinent to projects, and to make recommendations for changes. Both his individual scientific stature and his backing by management are such that his recommendations carry weight, and his help is welcomed by men whose bonuses are dependent on the efficiency and productivity of their teams.

Knowing that no one man can comprehend the complexity of modern science, the Science Director

has a staff of several specialists, in physical chemistry, in organic chemistry, in branches of physics. These men, drawn from a background of experience in the organization, competent in their special fields, round out the Science Director's own developed areas of scientific competence.

Formalization of the office of Science Director is new with the Arthur D. Little laboratories, but the practice has been developed over a considerable period. Highly specialized scientists, engaged in fundamental work and publishing original papers have acted as consultants to the staff, devoting considerable portions of their time, to various projects, either on request from the pro-

ject director, or as assigned members of the project team. The results have been so successful that the present experiment in research management is believed assured of success.

With this combination of a team selected for the specific requirements of the project, headed by a man with a successful record of accomplishment with other assignments, who is in immediate touch with the executive who can carry the results through to commercial fruition, and with the team given the powerful aid of highly competent scientists in the areas of science involved, it is not difficult to maintain enthusiastic efficient attack on a designated commercial objective.

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## A Rating for Technical Employees (Supervisory Ability)

K. C. Laughlin, F.A.I.C.

*Manager, Pilot Plant Division, Research Dept., Hercules Powder Company,  
Wilmington, Del.*

INDUSTRY has, in recent years, become more aware of the importance of better selection and training of men for supervisory positions. Many companies have adopted formal training programs for supervisors, and have based their selection of trainees on more or less formalized evaluation or rating techniques. Standardized rating sheets have been found to facilitate comparisons between men working in different departments. This discussion suggests a modification of the usual rating techniques which, it is hoped, will give a fairer and more complete appraisal of the man's abilities.

The viewpoint of the men working under the supervision of the employee under consideration may be used to give a more complete appraisal than can be obtained from his co-workers or his boss. Usually more ratings will be available, giving statistical protection against the emotionally-loaded rating. Frequently these ratings will be based on more day-to-day contact and under a wider variety of circumstances than those of co-worker or boss. Whether or not the man below can or will give the type of appraisal requested is open to question. In my

present position I have had opportunity over the last few years to explore this approach to rating technical personnel and I am anxious to compare notes with anyone working in a similar direction.

The Research Department of my company employs a rating sheet, modified from one introduced by Eastman Kodak, for rating of technical employees by their co-workers and superiors. Recently we have experimented in a limited fashion with forms for rating technical employees by men under their supervision. A copy of the form in its most recent modification is appended below. The attempt has been made to get a comprehensive rating while keeping the form brief and simple. An early observation was that the most useful ratings were obtained when the anonymity of the rater was guaranteed.

Ratings by superiors, co-workers, and subordinates are used in discussing with the individual his progress with respect to his current position and with respect to the future. The ratings are not at present used quantitatively, but only as an indication as to the man's strong points and weak points. In some cases the place-

ment of a man with others in his age and experience group differs markedly according to whether he was rated by his boss and co-workers or by his subordinates. Interpretation of the significance of these differences will require time to gain experience with the rating techniques and to observe the careers of the men rated.

I believe the choice of supervisory

personnel can be made on a fairer, sounder basis if the opinions of subordinates are considered together with those of co-workers and bosses. No doubt, it will take a long time to obtain documentary support of the idea. In the meantime, I shall welcome opinions as to the desirability of this approach, and how to implement it.

### **RATING FOR TECHNICAL EMPLOYEES (Supervisory Ability)**

Circle letter for rating. Use + sign for intermediate ratings.

Example: (b)+ is intermediate between (a) and (b) ratings.

Name of Employee.....Date.....

#### **1. ABILITY TO OBTAIN SUGGESTIONS AND IDEAS**

- a. Encourages suggestions and ideas—puts them to good use if they are workable and explains why not if they are unworkable. Sees that credit is given where due.
- b. Occasionally asks for suggestions or ideas—may or may not put them to use or give proper credit.
- c. Never asks for suggestions or ideas. Feels that he knows all the answers. Takes good ideas as his own.

#### **2. WILLINGNESS TO PASS OUT PERTINENT INFORMATION**

- a. Patient and thorough in passing out information. Checks to be sure information is understood.
- b. Somewhat impatient or reluctant about passing out information but usually gets important points across.
- c. Doesn't tell enough—always necessary to go back for more instructions.

#### **3. ACCEPTANCE OF RESPONSIBILITY**

- a. Doesn't pass the buck—takes the blame for his own errors.
- b. Occasionally blames others for errors due to his failure to make instructions clear.
- c. Blames others for everything that goes wrong even though it may be his fault.

#### **4. DISPOSITION**

- a. Stays calm but acts fast when things go wrong.
- b. Gets excited when things go wrong.
- c. Has tendency to fly off the handle, quick-tempered.

## A RATING FOR TECHNICAL EMPLOYEES

### 5. ABILITY TO WORK WITH OTHERS

- a. Excellent team worker, cooperative, gets along well with others.
- b. Tolerates other people, tends to his own business.
- c. Not thought of very highly by others—seems to be jealous of others.

### 6. METHOD OF CRITICIZING

- a. Commends men for work well done and criticizes only after careful consideration and with obvious intention of helping.
- b. Occasionally criticizes without consideration—not always helpful criticism—sparing of praise.
- c. Criticizes angrily or sarcastically and in the presence of others.

### 7. ATTITUDE ON SAFETY

- a. Always safety-conscious. Makes special check on new or unfamiliar operations.
- b. Does not always consider safest way of doing operation—more interested in getting work done.
- c. Does not consider safety aspects of operations—careless himself.

### 8. ABILITY TO COMMAND RESPECT TECHNICALLY

- a. Quick in understanding problems and applying results. Makes helpful suggestions on problem solving. Keeps clear view of broad objectives and progress in attaining them. Uncompromisingly honest.
- b. Sometimes fails in complete understanding of problems or in proper application of results. Sometimes lets interest in side issue obscure broad objectives.
- c. Slow to understand problems or interpret and apply results. Lets administrative details monopolize his time. Sometimes slants interpretation of results to favor preconceived ideas.

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#### Soil Conditioner Conference:

Sponsored by Henry A. Dreer, Inc. of Philadelphia, Pa., at the Plaza Hotel, New York, N. Y., on November 10th. Richard A. Snelling, president of Dreer, presided. Several other consultants and associates of the Dreer Company were on the program, and James A. Horton, director of the Federal Trade Commission, Bureau of Industry Cooperation, was the guest speaker.

Mr. Horton urged the establishment of standards and practices cov-

ering both marketing and advertising in the highly competitive field of soil conditioners, explaining the advantages of voluntary cooperation within the industry.

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**Announced:** By Dr. Walter Guthmann, president of Edwal Laboratories, Ringwood, Ill., that Thomas T. Hill, Edwal's chief photographic chemist, is being loaned to the Air Research & Development Command as a consultant.

**Golden Anniversary:** Of research by Lever Brothers Company, 390 Park Avenue, New York 22, N. Y., was marked by the dedication of the company's new Research Center at Edgewater, N. J., on November 18th.

The new Research Center is a five-story brick and glass structure, air-conditioned throughout, and a two-story pilot plant, both located on the west side of the Hudson River with a dramatic view of the New York City skyline. It brings together many developmental activities formerly located in the company plants throughout the country.

Lever president Jervis J. Babb said, "At the new Research Center, we will carry on this fifty-year tradition of constantly striving to improve existing products and develop new ones designed to lighten the load of housework and make everyday living more pleasant for everyone."

Within the modern Research Center are individual laboratory units, designed to be flexible by the use of cinder block partitions which can be removed or changed as conditions require them. Among the special laboratory units are: Perfume "consoles" consisting of semi-circular shelves containing hundreds of oils and fragrances where chemists select and mix odors for toilet products; a spectrophotometric and X-ray laboratory; a home laundry room in which housewives participate; a dental clinic with

Lever-developed brushing machines; a hair laboratory staffed by beauticians; a complete bakery; a laboratory which studies films, foams, and suds; and a super-sonic washing machine.

The Research Center is directed by Dr. L. B. Parsons, director of research and development, a part of the Production Division headed by vice-president William H. Burkhart. To Dr. Parsons five assistant research departments report; Chemical and Physical Research, headed by Dr. William M. Bright; Product Improvement and Development, headed by Dr. Sol D. Gershon; Process Improvement and Development, headed by Stanley I. Shafer; Technical Services, headed by G. Webb Rogers; and Special Research, headed by Dr. M. K. Anson.

The laboratory personnel, numbering over 300, include biochemists, chemical engineers, bacteriologists, physicists, organic, inorganic, and analytical chemists, physiologists, physical chemist, perfumers, pharmacists, food chemists, nutrition experts, dentists, beauticians, cosmeticians, dermatologists, toxicologists, pathologists, histologists, and bakers.

The products of Lever Brothers, which result from this extensive program of research and development, include toilet soaps, laundry soaps and detergents, tooth powders and pastes, shaving cream, shampoos, and home permanent waves, margarine, mayonnaise, and dressing, perfumes and cosmetics.

# A Chemist Looks at Human Blood

**Dr. Herman J. Schneiderwirth, F.A.I.C.**

*Research Associate, Sharp & Dohme, Inc., Glenolden, Pa.*

**N**OTHING takes the place of Whole Human Blood. Nothing is so delicate, or complex in its function, as the red blood that flows through our heart, arteries, and veins carrying nutriment and oxygen to the body tissues. When this blood is removed from the body and carefully placed into sterile bottles, it stays alive for a while, a short while indeed. During this time it carries on an existence that is being studied by many scientists. It breathes, its cells continue to carry on their complex biofunctions including enzyme action and many others, like any living organism struggling for survival. It is a vain fight though, because finally it succumbs and dies. "Moraturi te salutant." After twenty-one days, sometimes a little bit longer, its time is up. Of course, the blood is still there in its sterile confinement. It looks all right, has no odor, its red blood corpuscles and all the other elements remain, but they are quite dead. The wounded soldier in the battlefield, the bleeding victim of an accident, would get little benefit from a transfusion out of the bottle after this critical date.

## **The Aims of Research**

The study of human blood is fascinating because it holds so many mysteries. To solve even some of them

will advance not only the status of our present knowledge of blood itself, but will also most likely contribute to our fight against the main enemies of health, heart disease and cancer. One important goal of the study of human blood is to make it live longer or perhaps permanently after it has been removed from the body.

To control and direct the survival or death of living cells has always been an important objective of the biosciences. The expanding knowledge of pro- and antibiotics which has made such rapid strides during the past decade, has given an encouraging lead to those who patiently scrutinize the secrets of human blood. "To be or not to be, that is the question." Surely, Shakespeare in his time did not look at the puzzle of life the way we do today. Yet, by referring to the fate of human beings, he referred to the fate of billions and billions of tiny, living, microscopic cells which are studied by us today.

## **The Blood They Work With**

For those who have never seen human blood in a transfusion bottle and how it gets there the following will explain. The donor lies down on a cot. He relaxes while a pretty, smiling nurse gently places a hypodermic needle into a vein near the elbow. The

needle is fastened to a rubber hose which is connected with the blood bottle. The latter is under a vacuum which means that part of the air has been removed from it. This procedure does not hurt at all. The blood at once begins to flow in an even, red stream from the human vein into the bottle. Only one pint or approximately less than one-tenth of the blood present in a human body is drawn off. This amount can easily be spared because a healthy body will replace it in a short time. To prevent the blood from clotting, which means to form a solid gel as it does when it flows out of a cut in your finger, a small amount of sodium citrate has been placed into the transfusion bottle. This addition keeps the blood in a liquid state. All of this is done, of course, under strictly aseptic conditions. Competent nurses see to it that no bacteria sneak into the blood while it is transferred.

Now, there is the essence of life in a bottle! What is done with it thereafter? First it is put on ice because cold preserves. Then it is rushed by air or rail to a processing plant where the so-called plasma is separated from the red blood corpuscles, and other elements present in whole blood. This plasma consists of albumins and globulins which are the natural environment in which the blood cells live. (How this human plasma is prepared and converted into a permanently stable, dry form has been described

by the author in an illustrated article which appeared in the October, 1951, issue of the *American German Review* Philadelphia, Pa.)

A very small part of the whole blood collected in the manner described, is flown over to our boys fighting on the Korean Battlefields. It takes about five days to get there, but there are still sixteen days of life left, during which it, in turn, can save a life.

When blood first flows into a bottle it looks good and red all the way through. It is like fresh tomato juice or the inside of a juicy, rare steak. As a matter of fact, blood is made from that steak because the latter provides the protein building blocks necessary for its biosynthesis.

But wait a few hours and look at the blood again. It seems that the red corpuscles and others did not like their artificial imprisonment very much. They gradually separated from the plasma and, perhaps in protest, moved down to the bottom of the bottle. This downward movement appears to be the beginning of their doom.

#### **What They Think About Survival of Blood in a Bottle**

Three major types of cell elements are dispersed in the fluid, practically colorless blood plasma. They are the red corpuscles called erythrocytes, the white corpuscles called leucocytes, and the platelets. The erythrocytes are the most numerous and important of the three. Therefore, their survival is of prime importance. This is under-

## A CHEMIST LOOKS . . .

standable because the major function of the red cells is to carry oxygen to the body tissues. If the latter are supplied insufficiently with this vital element, a so-called "State of Shock" develops.

"The patient in shock is prostrated; weakness is profound; he is usually conscious and oriented, but mental effect is shallow. He is often restless, complains of thirst, sometimes also of pain. His skin is cold and moist, lips pale; sometimes he is cyanotic; pulse thin and increasingly rapid; peripheral veins collapsed; blood pressure falling, and urine formation suppressed. The types of trauma most likely to result in shock are extensive crushing injuries, traumatic amputations, major fractures, severe burns, and severe extremity wounds. Except with excessive hemorrhage, the fully developed picture of shock often comes on only progressively after several hours . . . . The definite treatment of wound shock is restoration of blood and tissue fluid volumes. For this purpose whole blood is obviously best."<sup>1</sup>

It is known that red blood cells are microscopically small, more or less round bags. The cell membrane is thin, elastic and semipermeable. The latter means that it lets certain substances pass through its walls into the inside, as well as others from within into the outside. This is done select-

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ively, as needed for the survival of the cell. The inside contains the hemoglobin which is a complex living substance. To keep it alive, so that it can fulfill its various functions, it must have oxygen. In the living body the oxygen is constantly provided by the air that we breathe. This oxygen is transported to every part of the tissues and given up to support life. Blood confined in a bottle also needs oxygen for its own breathing. When the supply in the bottle is exhausted the cell most likely will die. Furthermore, the blood cells in a bottle must be fed, so to speak. They must have access to infinitesimal small amounts of vital substances such as minerals, vitamins, hormones, and carbohydrates as well as others of which we know little today.

Some of these substances combine to produce enzymes which transform one substance into another. Enzymes are the dynamite of living cells. The full understanding of their function will be a great help in understanding life itself.

1. D. W. Richards, Jr., M.D., "The Nature and Treatment of Shock." The Merck Report, 61 (April, 1952) 18.

Among other factors, the conservation of human blood outside of the body involves the maintenance of the delicate cell membrane of the blood corpuscles. Secondly, it involves the restraint of the dynamic, hemoglobin content which this membrane encloses. Bioactivity inside the membrane should continue at a moderate rate, yet all biofunctions should be kept intact. An over-active cell system would soon "burn itself out," and irreversibly perish.

These two points were well brought out at a symposium on "Frontiers of Research on Blood and Plasma Extenders," marking the formal dedication of the new Sharp and Dohme Medical Research Laboratories, West Point, Pennsylvania, May 12, 1952. Dr. R. B. Pennell had this to say: "To take extreme examples, application of fragility measurements of red cell membranes treated with formaldehyde or acrolein will indicate extreme stability of the structure of such cells. The selective permeability of these cells is lost, however, and the pigment is converted entirely to an inactive and useless form. Again, certain types of blood collections provide erythrocytes of unusually high glycolytic activity, suggesting cells of unusual vitality, yet in the presence of this heightening activity the cell membrane is exceedingly fragile."

With other words, if the cell membrane is strengthened too much, it loses its selective permeability and



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kills its contents. If on the other hand the latter show a very high degree of vitality, they may break the unprotected membrane and spill into the surrounding fluid. This so-called hemolysis would be equally pernicious.

Finally, many scientists believe that the three blood cell elements are dependent upon each other for survival. They, therefore, either live or die together.

These are only some, although important considerations, which occupy the minds of those who work for the Conservation of Human Blood today. Their problems are manifold and difficult to solve. Yet the stakes are high because success would mean the saving of untold human lives tomorrow.

## In Memoriam

### Gustavus J. Esselen

With the death of Dr. Esselen on October 22, 1952, the chemical profession lost one of its most loyal and active members. Dr. Esselen was born in Roxbury, Massachusetts, on June 30, 1888. He received the A.B., A.M., Ph.D. degrees from Harvard University. He was employed by the General Electric Company and later by Arthur D. Little, Inc. In 1921, he became an officer in the firm of Skinner, Sherman, and Esselen Company, Inc. Dr. Esselen formed his own consulting organization in 1930 and continued in this activity until 1949, when his Esselen Research Corporation merged with the United States Testing Company.

Throughout his career, Dr. Esselen served not only the chemical profession but his community, state and nation as well. He has been a director of The American Institute of Chemists, American Chemical Society, American Institute of Chemical Engineers, Association of Consulting Engineers, Association of Consulting Chemists and Chemical Engineers, American Academy of Arts and Sciences, and the Boston Chamber of Commerce. He has been chairman of the American Section of the Society of Chemical Industries; treasurer, vice president and later president of the American Council of Commercial Laboratories, and president of the Rotary Club of Boston.

He was an active member of the American Association for the Advancement of Science, Society of Plastic Industry, Society of Plastics Engineers, Associated Industries of Massachusetts, Engineering Societies of New England and the New England Council, Technical Association of the Pulp & Paper Industry. Other memberships included the Alpha Chi Sigma, Sigma Xi, Boston Congregational Club, the Harvard Club of Boston, Union Club of Boston, Cosmos Club, Washington, D.C., and The Chemists' Club, New York. He was a delegate of the National Academy of Sciences to the International Union of Chemistry in 1930 and 1936.

Although Dr. Esselen's special fields of interest were concerned with resins and plastics beginning with his early association with cellulose acetate, his interests and those of his company were much broader, covering much of the field of chemical technology.

He received numerous patents and was the author of many papers as well as contributing to several books. He served as an associate editor of The Textile Research Journal and held honorary lectureships at Brown University. He received many honors for his professional and scientific work, including honorary membership in

The American Institute Of Chemists and the modern pioneer award from the National Association of Manufacturers.

His civic activities included the chairmanship of the Massachusetts Board of Registration of Professional Engineers and Land Surveyors. He was a member of the Referee Board of the Office of Production, Research and Development and acted as consultant to the Baruch Rubber Survey Committee.

He held a commission in the Chemical Warfare Reserve for many

years. In his home town of Swampscott, Massachusetts, he served on many committees and boards and was particularly active in religious affairs, not only in his own Congregational Church but in interdenominational Councils.

Dr. Esselen is survived by his wife, the former Henrietta Locke, two daughters, Mrs. Bradford K. Bachrach and Mrs. George Hanson, and a son, Gustavus J. Esselen, 3rd, who is associated with the United States Testing Co., Inc.

—DR. A. W. FISHER, JR.

## Resolution

WHEREAS, We, the Council of THE AMERICAN INSTITUTE OF CHEMISTS, have learned with profound sorrow of the death, on October 22, 1952, of our colleague

GUSTAVUS J. ESSELEN  
and

WHEREAS, Dr. Esselen, in the true spirit of THE AMERICAN INSTITUTE OF CHEMISTS, of which he was a Fellow and an Honorary Member, has devoted a large part of his efforts to the furtherance of the professions of chemist and chemical engineer, not only as an individual with individuals, but also through responsible positions in many professional organizations both national and international; and

WHEREAS, in his personal life, through civic and religious service to his state and his nation he has

enhanced the standing of chemists and chemical engineers outside the professions; and

WHEREAS, his native ability in the field of chemical technology resulted not only in many important technical contributions but also in his high professional standing, which with his unusual personal qualities made him a strong leader as well as an effective servant of his professional colleagues;

THEREFORE, BE IT RESOLVED, that this Council hereby record its recognition and appreciation of the great services of this outstanding Fellow of THE AMERICAN INSTITUTE OF CHEMISTS, its deep sense of loss, and its sincere sympathy to his family; and that a copy of this resolution be spread on the minutes of the Council and a copy be sent to his family.



## COUNCIL

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*New England Chapter*  
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#### National Council Meetings

Meetings of the AIC National Council are scheduled to be held at The Chemists' Club, 52 East 41st St., New York, N. Y., at 6:00 p.m., on the following dates:

January 14, 1953

March 11, 1953

April 8, 1953

May 11, 1953 (Philadelphia, Pa.)

#### November Meeting

The 285th meeting of the National Council was held November 12, 1952, at The Chemists' Club, New York, N. Y. President Lincoln T. Work presided.

The following officers and councilors were present: M. L. Crossley, T. R. Donlan, F. A. Hessel, H. O. Kauffmann, D. B. Keyes, J. H. Nair, D. Price, M. Sittenfield, F. D. Snell, R. Stevens, L. Van Doren and L. T. Work. A. W. Fisher, Jr., K. M. Herstein, B. Sweedler, and V. F. Kimball were present.

President Work stated that he had attended the presentation of Honorary AIC Membership to Dr. Glenn T. Seaborg, Nobel Laureate, at a meeting of the Los Angeles Chapter, September 25th. Preceding the meeting, President Work met with

the officers of the Los Angeles Chapter to confer with them on their local problems. The Los Angeles Chapter is an active group under the chairmanship of Frank T. Bewley. A need for a Chapter in the San Francisco Bay area was discussed.

President Work made the presentation of Honorary AIC Membership to Dr. Sidney D. Kirkpatrick at a meeting of the New York Chapter held October 9th. Dr. Work also attended the meeting of the Chicago Chapter, October 10th, when the Chapter's Honor Scroll was presented to Bernard E. Schaar.

The INSTITUTE was represented by delegates at three recent educational ceremonies—Meharry Medical College, Nashville, Tenn.; Tufts College, Medford, Mass., and Wagner College, Staten Island, N. Y.

Mr. Sittenfield, heading the Arrangements Committee for the 1953 Annual Meeting, reported that the Committee had selected the Benjamin Franklin Hotel as headquarters for the meeting. Tentative plans for the two-day program at the Annual Meeting were discussed.

The Secretary reported that the present membership of the INSTITUTE now numbers 2587. He announced with deep regret the deaths of Dr. Gustavus J. Esselen, Hon. AIC, on October 22nd, and of Jacob Jay, F.A.I.C., in July.

The Secretary presented a report from C. C. Concannon informing the Council that the next meeting of the Washington Chapter would be held on November 12th, with Dr. E. E.-Fogel, chief of the Chemical Rubber Drugs and Fuels Division of the Office of Price Stabilization, as speaker.

Dr. Hessel reported that he had attended the Southeastern Division meeting of the American Chemical Society, at Auburn, Alabama, and that a strong interest was expressed in the certification of chemists as distinguished from the licensing of chemists.

Upon motion made, seconded, and carried, a resolution was adopted on the death of Dr. Gustavus J. Esselen, councilor-at-large. (See page 612.)

Mr. Nair reported as chairman of the Committee on Membership that the Committee had met November third and outlined procedures for effective functioning. During the discussion, suggestions were offered for the consideration of the Committee.

Mr. Nair reported as chairman of the Committee on Emeritus Membership, and the report of the Committee was accepted.

Mr. Sweedler reported as chairman of the Committee on Constitution and By-laws, reading some of the material subject to change. He was requested to send copies of the suggested changes to the councilors.

Dr. Keyes reported as chairman of the Committee on Manpower. He sketched the present situation with regard to the use of scientific manpower and the situation as it may exist within the next five years. He discussed the attitude of other societies and requested the cooperation of the AIC to implement a more effective use of technical manpower.

The Secretary reported for the Jury of Medal Award that Dr. John C. Warner, president of Carnegie Institute of Technology, Pittsburgh, Pa., had been selected to receive the 1953 Gold Medal of the Institute. The medal will be presented to Dr. Warner at the Annual Meeting. It was voted to confer Honorary AIC membership on Dr. Warner at the time that the Gold Medal is presented.

The vacancy on the Council caused by the death of Dr. Esselen was filled by the appointment of Dr. Harvey A. Neville of Lehigh University to hold this position until the next Annual Meeting.

Mr. Sittenfield announced that the next meeting of the Pennsylvania Chapter will be held December 4th, when the Chapter's Honor Scroll will be presented to Dr. Percy A. Wells, director of the Eastern Regional Research Laboratory.

Mr. Herstein reported that on December 11th a Young Chemists' Meeting will be held by the New York Chapter, to be addressed by a panel of persons qualified to speak on the employment situation for young chemists.

Dr. Donlan stated that the New Jersey Chapter would meet, December 2nd, to hear Dr. G. L. Royer, F.A.I.C., speak on "American Chemical Society Professional Activities," and James Osterberg of the New York Police Department speak on "Science vs. Crime."

Dr. Kauffmann reported that the Niagara Chapter met recently to enjoy a lecture on "Flora and Fauna in Bermuda." At the meeting to be held February 4th,

Honorary AIC Membership will be presented to Dr. R. Lindley Murray.

Dr. Fisher stated that on November 18th, the New England Chapter will meet to hear Earl P. Stevenson discuss the "National Science Foundation."

The following new members were elected:

#### FELLOWS

##### **Eby, Lawrence T.**

*Research Chemist, Standard Oil Development Chemical Division, Linden, New Jersey.*

##### **Devaney, Lawrence Welch**

*Assistant Personnel Administrator, Linde Air Products Company, Tonawanda, New York.*

##### **Fullaway, Richard Merle**

*Engineer, Producing Department, Standard Oil Company of California, 225 Bush Street, San Francisco, California.*

##### **Garrett, Alfred B.**

*Professor of Chemistry, Ohio State University, Columbus, Ohio.*

##### **Idson, Bernard**

*Project Leader—Biochemistry, General Foods Corporation, Hoboken, New Jersey.*

##### **Morgan, Clarence Richard**

*Chemistry, Arthur D. Little, Incorporated, Memorial Drive, Cambridge, Massachusetts.*

##### **Smith, Francis Laverne**

*Chief Chemist, Hancock Oil Company, Box 810, Long Beach, California.*

#### MEMBERS

##### **Burns, George D.**

*Research Chemist, Wax Department, Foster D. Snell Incorporated, 29 West 15th Street, New York 11, New York.*

##### **Sternberg, Leon**

*Consulting Chemist (Industrial), Chemit Company, 247 Belmont Avenue, Brooklyn 7, New York.*

#### ASSOCIATE

##### **O'Connor, Edward Stephen**

*Chemist, Pfister Chemical Company, Ridgefield, New Jersey.*

#### RAISED FROM MEMBER TO

##### FELLOW

##### **Coneybear, Savery F.**

*Vice President and Development Manager, Evans Research and Development Corporation, 250 East 43rd Street, New York 17, N. Y.*

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##### **Holler, Albert C.**

*Chief Analytical Chemist, Twin City Testing and Engineering Laboratory, 2440 Franklin Avenue, St. Paul, Minnesota.*

#### RAISED FROM ASSOCIATE TO FELLOW

##### **Tinker, John Frank**

*Research Chemist, Eastman Kodak Company, Building 129, Rochester, New York.*

**Representative:** Dr. Lloyd A. Hall, F.A.I.C., technical director, The Griffith Laboratories, Inc., who represented the American Chemical Society at the recent inauguration of Dr. Harold D. West as president of Meharry Medical College, Nashville, Tenn.

On October 24th, Dr. Hall addressed a luncheon meeting at the Union League Club of Chicago on "A Scientist Analyzes Race Relations."

**Appointed:** Dr. Lewis H. Rogers as head of the Division of Analytical Chemistry, National Dairy Research Labs., Inc., Oakdale, N.Y.

## AIC Activities

C. P. Neidig, F.A.I.C.

### Symposium on Public Relations for Chemists

An all-day, joint meeting of the New York Section of the American Chemical Society and the New York Chapter of THE AMERICAN INSTITUTE OF CHEMISTS will be held on Thursday, January 15, 1953, at the Hotel Commodore, New York, N. Y.

The morning session will be opened at ten o'clock by Karl M. Herstein, chairman of the New York AIC Chapter. Dr. Walter J. Murphy, Hon. AIC, will preside. Robert L. Taylor, F.A.I.C., vice-president of Hill and Knowlton, Inc., will speak on "Why Public Relations for Chemists." Dr. Henry B. Hass, F.A.I.C., president of the Sugar Research Foundation, Inc., will discuss "The Chemist and His Profession," and Dr. Emil Ott, F.A.I.C., director of research of Hercules Powder Company, will consider "The Responsibilities of the Chemist to His Country." A luncheon will follow in the Grand Ballroom of the hotel.

At two o'clock, Dr. E. J. Durham, chairman of the New York Section of the American Chemical Society, will introduce the afternoon session. Dr. Raymond E. Kirk, F.A.I.C., dean of the Graduate School of Polytechnic Institute of Brooklyn, will admonish the meeting, "Don't Be a

Stillborn Chemist." Dr. George F. Rugar, F.A.I.C., assistant manager of the Technical Service Division of Diamond Alkali Company, will speak on "The Chemist and His Industry." Robert B. Semple, F.A.I.C., president of Wyandotte Chemical Company, will discuss "Industry and Its Chemists." Dr. J. C. Warner, president of Carnegie Institute of Technology, will address the assembly on "The Professor and His Public." A discussion period will follow both the morning and afternoon programs.

Chemists are cordially invited to attend these sessions, for which there is no charge. There is a charge of \$3.50 for the luncheon, and reservations for this should be made and paid by mail before January 13th. Please send luncheon reservations to: Dr. Orville Breivik, Fleischmann Laboratories, 810 Grand Concourse, New York 51, N. Y.

### Addresses Wanted

Addresses are wanted for the following members of *The American Institute Of Chemists*. If you know the current address of any of these persons, please send it to Dr. Lloyd Van Doren, secretary. The American Institute of Chemists, 60 East 42nd Street, New York 17, N. Y.

#### Name and Last Known Address

Darvin Arkow  
124-12 109th Avenue  
South Ozone Park 20, New York  
George C. Ashman, Jr.  
141 South Ringold Street  
Janesville, Wisconsin

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197 Sandford Street  
New Brunswick, New Jersey

Dr. Herman Jay Lanson  
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August H. Maki  
859 41st Street  
Brooklyn 32, New York

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2237 Lowell Avenue  
Louisville 5, Kentucky

Robert Bruce Mosely  
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Edward N. Weber  
17 Highview Road  
Buffalo 21, New York

Alex Weinerman  
965 East 26th Street  
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### New England Chapter

*Chairman*, Dr. A. W. Fisher, Jr.  
*Secretary-Treasurer*, James W. Perry  
*Representative to National Council*, Raymond Stevens

The New England Chapter held its first meeting of the year on November 18th, at the Massachusetts Institute of Technology Faculty Club. Following a social hour and dinner, Earl P. Stevenson, president of Arthur D. Little, Inc., discussed the aims and progress of the National Science Foundation, of which he is a director. The discussion following the talk showed strong interest in the subject and many interesting suggestions were presented.

### Will You Come?

**Dec. 2, 1952.** New Jersey Chapter. Military Park Hotel, Newark, N. J. Dinner 6:30. (\$2.90). Speakers: Dr. G. L. Royer, F.A.I.C., on "American Chemical Society Professional Activities;" James Osterburg of the New York Police Department, on "Science versus Crime." For information write David W. Young, Esso Laboratories, P. O. Box 51, Linden, N. J.

**Dec. 4, 1952.** Los Angeles Chapter. Dinner meeting. Speaker: Dr. Harold Olcott, Head, Vegetable Processing Div., Western Regional Research Lab. on "Chemical Contaminants and Additives in the Food Industry." Panel Discussion to include Dr. Guenther of University of California, and representatives from firms which market food additives. For information write, F. T. Bewley, Braun Corp., Los Angeles, Calif.

**Dec. 4, 1952.** Pennsylvania Chapter. Honor Scroll to be presented to Dr. Percy A. Wells, director Eastern Regional Research Laboratory, at the

## AIC ACTIVITIES . . .

Penn-Sheraton Hotel, Philadelphia, Pa. Dr. John J. Willaman, Eastern Regional Research Laboratory, will speak for the recipient. Dr. Lincoln T. Work, AIC President, will make the presentation. For information write Dr. A. Farkas, Barrett Div., Allied Chemical & Dye Corp., Philadelphia 37, Pa.

**Dec. 10, 1952.** Washington Chapter. Bonat's Restaurant, 1022 Vermont Ave., N.W., Washington, D. C. Luncheon 12:15 p. m. Speaker: Dr. Walter J. Murphy, Hon. AIC, "Public Relations for Chemists."

**Dec. 11, 1952.** New York Chapter. Young Chemists' Meeting. 8:00 p.m. Hans Jaeger's Restaurant. (\$1.50), 85th St. & Lexington Ave., New York, N. Y. Panel discussion on Job Finding. Speakers: John Andrews, Polytechnic Institute of Brooklyn; Gordon Whitcomb, American Cyanamid Co.; Ward Jackson, Commercial Solvents Co.; Donald Price, Oakite Products Co. Karl M. Herstein presiding.

**Jan. 15, 1953.** New York AIC Chapter jointly with the New York Section of the American Chemical Society. Hotel Commodore, New York, N. Y. Symposium on Public Relations.

**Jan. 16, 1953.** Chicago Chapter. Chicago Engineers' Club, 314 South Federal St., Chicago, Ill. Cocktails 6 p.m.; Dinner 6:30 p.m.; Meeting 7:30 p.m. Speaker: Dr Otto Eisenschiml, F.A.I.C., "Do You Want Your Son to be a Chemist?" Reservations to John Krc, Jr., 3240 West 62nd Place, Chicago, Ill.

**Feb. 4, 1953.** Niagara Chapter. Hotel Niagara, Niagara Falls, N. Y. Presentation of Honorary Membership in the AIC to R. Lindley Murray, president of Hooker Electrochemical Co. Dr. Lincoln T. Work will make the presentation. Reservations should be made with T. E. Gilbert, 354 East Utica St., Buffalo 8, N. Y.

**Feb. 5, 1953.** Pennsylvania Chapter. Dr. Randolph T. Major, vice-president and scientific director, Merck and Company, will speak on "The Research Chemist in the Pharmaceutical and Medicinal Chemical Industry." For reservations call or write, Dr. V. V. Bellino, Barrett Div., Allied Chemical & Dye Corp., Philadelphia 37, Pa. (JE-3-3000).

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**May 7, 1953.** Pennsylvania Chapter. Dr. Sidney D. Kirkpatrick, editorial director, McGraw-Hill Book Co., will speak on "The Rocky Road of the Chemical Professor." At this meeting Student Medals will be awarded. For information and reservations: Dr. V. V. Bellino, Barrett Div., Allied Chemical & Dye Corp., Philadelphia 37, Pa. (JE-3-3000).

**May 12-13, 1953.** Annual Meeting of The American Institute of Chemists. Benjamin Franklin Hotel, Philadelphia, Pa. Presentation of A.I.C. Gold Medal to Dr. J. C. Warner, president of Carnegie Institute of Technology. Committee on Arrangements: Marcus Sittenfeld, C. P. Neidig, and Hillary Robinette.

## Opportunities

**Doris Eager, M.A.I.C.**

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**Chemist, M.S., F.A.I.C.:** 12 years' experience in synthetic organic, biological research, and production. Age 38. Permanent affiliation of prime importance. Box 120, THE CHEMIST.

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### Positions Available

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## AIC ACTIVITIES . . .

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**New Division:** Microbiology, established by Mellon Institute, Pittsburgh, Pa. The division will have as its head William W. Leathen, a Fellow of Mellon Institute since 1946.

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**Established:** By Edward G. Brown, the Brown Chemicals company at 15 Moore Street, New York 4, N. Y. It will manufacture, process, import, and distribute vegetable oils and specialties.

## For Your Library

### Thiophene and Its Derivatives

By Howard D. Hartough. Interscience Publishers, Inc. 1952. 533 pp. \$16.50.

One of a series of texts being published on "The Chemistry of Heterocyclic Compounds," this book is the first and only up-to-date review of the chemistry of thiophene published in English. It is a valuable addition to the technical literature because thiophene, which is now available commercially, has a number of reaction mechanisms different from benzene and has many derivatives which seem to this reviewer to possess interesting commercial possibilities.

In addition to chapters on the synthesis and physical properties of thiophene and its homologs, factors affecting substitution reactions in the thiophene nucleus, alkylation, polymerization, hydrogenation, miscellaneous reactions of thiophene, halothiophenes and haloalkylthiophenes, nitro and amino thiophenes, thiophene compounds containing nitrogen in the side chains, hydroxy thiophenes, aldo, keto, carboxy, sulfur derivatives, metals and miscellaneous metalloid derivatives synthesis and properties of di- and polythienyls and aryl thiophenes, there is a chapter by F. F. Blicke, of the University of Michigan, on the biological and pharmacological activity of thiophene and its derivatives; a chapter by Frank P. Hochgesang, of the Socony Vacuum Laboratories, on molecular structure and spectroscopy of thiophene and its derivatives; and a very valuable appendix on laboratory preparation of thiophene compounds.

—DR. FREDERICK A. HESSEL, F.A.I.C.

### Heterocyclic Compounds

Vol. 3. *Polycyclic Derivatives of Pyrrole; Polycyclic Systems with One Nitrogen Common to Both Rings; Pyridine and Related Compounds.* Edited by Robert C. Elderfield. John Wiley & Sons, Inc. 1952. 442 pp. \$12.00.

This third volume of the series on Heterocyclic Compounds covers those of five or six members containing one O or S atom and the major portion of the book is devoted to the chemistry of the Indoles.

So much has been written on these compounds that it has been necessary to omit any detailed discussion of the alkaloids in the group but references are given to the literature covering them. Cross references throughout have been used as a means of avoiding, as far as possible, the overlapping and repetition in such a series. The arrangement of subject matter has been difficult but the editor has made a logical choice and these volumes will prove of real value to the organic research chemist.

—DR. FREDERICK A. HESSEL, F.A.I.C.

### The Terpenes

Vol. III. *The Sesquiterpenes, Diterpenes and Their Derivatives.* Sir John Simonson, Dr. Sc. and D. H. R. Barton, Dr. Sc. With Addenda D F 1. I & II. Cambridge University Press. 1952. 579 pp. \$10.00.

This brings up to date our knowledge of the terpenes, which Sir John Simonson and his associates have so conscientiously assembled. To the latest references on sesquiterpenes and diterpenes have been added addenda Volumes I and II, dealing, respectively, with the simple Acyclic and Monocyclic and the Dicyclic Terpenes. Indices of authors and subjects are given. So much material is contained in this tightly packed volume that print, tables and charts have been greatly compressed. Careful attention is required of the reader but the organic research chemist will find here a veritable mine of information.

—DR. FREDERICK A. HESSEL, F.A.I.C.

### Advances in Catalysis

Vol. IV. Academic Press, Inc. 455 pp. \$9.50.

This book contains pertinent, authoritative, and practical data on Catalysis, Catalytic Cracking, by R. C. Hansford; Decomposition of Hydrogen Peroxide by H. Boxendale; Properties of Cracking Catalysts by Herman E. Ries, Jr.; Acid Base Catalysis, by R. P. Bell; Theory of Physical Adsorption, by T. L. Hill; Surface Heterogeneity by George D. Halsey; Gasoline Synthesis from CO and H<sub>2</sub> by Helmut Pichler; Hydrogen Peroxide Reactions, by Joseph Weiss, and Reactions of Hemoproteins, by Philip George.

—DR. JOHN A. STEFFENS, F.A.I.C.

FOR YOUR LIBRARY . . .

### Acids and Bases

*Their Quantitative Behavior.* By R. P. Bell. Methuen Monograph. John Wiley & Sons. 90 pp.  $4\frac{1}{4}" \times 6\frac{3}{4}"$ . \$1.50.

This book gives the modern theory of acids and bases in aqueous and non-aqueous solutions and applications to molecular structure and catalysis.

### Experiments in Biochemistry

By Max S. Dunn and William Drell. McGraw-Hill Book Co. 251 pp.  $8\frac{1}{2} \times 11\frac{1}{4}"$ . \$5.00.

This is a laboratory guide for experiments in biochemistry, giving a wide range in the syntheses of amino acids and derivatives, isolation of sterols, testing and identification of carbohydrates, purines, determination by microbiological assay of choline and nicotinic acid and chick-bone ash method for vitamin D. The individual experiments are clearly presented and adequate directions for the preparation of reagents and apparatus are given with notes and references. This is strictly a student laboratory guide but useful to laboratory practitioners.

—DR. JOHN A. STEFFENS, F.A.I.C.

### Plan de Riegos e Industrializacion de las Islas de Lanzarote y Fuerteventura

By Chamorro, Manuel. Mancomunidad Interinsular de Cabildos de la Provincia de las Palmas, Santa Cruz de Tenerife, 1951.

This study of the islands of Lanzarote and Fuerteventura is a most interesting introduction to the Canaries since it contains information about the history, geography, geology, climate and economics of the entire archipelago, with particular emphasis, of course, on the two islands just now being developed industrially. For the chemist the book is particularly significant because the industries which may revolutionize the lives of the Canary Islanders are dependent upon chemical processes for their development.

Maps, charts, illustrations and bibliography make this a most informative volume.

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## Chemical Books Abroad

RUDOLPH SEIDEN, F.A.I.C.

Carl Hauser Verlag, Munich 27: *Chemische Technologie*, 3, by K. Winnacker and E. Weingaertner, 1952, 911 pp., (360 ill., 224 tables), DM 79. In the February and April, 1951, issues of THE CHEMIST, volumes 1 and 2 of this 5-volume standard work on chemical technology were reviewed. Now volume 3 has come off the press: *Organische Technologie*, 1, i.e., the first part of the survey of our present day knowledge of organic technology. As in the past, many experts contributed to this work. The main chapters deal with the processing of the various types of coal, mineral oils, solvents, synthetic motor fuels (obtained through pressure hydration), methanol and isobutyl syntheses, wood, wood carbonization, wood pulp, paper, aliphatic chemicals, synthetic fibers, and the modern Fischer-Tropsch synthesis. It seems impossible indeed to suggest any improvement for this magnificent publication. • *Praktikum der gewerblichen Chemie*, by Max Hessenland, 3rd ed., 345 pp., (60 il.), DM 26. A different type of chemistry textbook—one that uses 444 laboratory experiments to teach the pupil not only the fundamental laws of chemistry, but primarily the practically important production methods of commercially available chemical compounds, e.g., sugar, leather, etc. A unique text and laboratory book worth translating—it would find many interested readers and users among chemistry teachers and students in this country.

Springer Verlag, Berlin W 35: *Kurzes Lehrbuch der anorganischen und allgemeinen Chemie*, by G. Jander and H. Spandau, 5th ed., 563 pp. (169 ill.), DM 19.80. One of the newer textbooks of inorganic and general chemistry which, based on the author's teaching experience, well balances descriptive information and discussion of fundamental principles. • *Chronologische Uebersichtstabellen zur Geschichte der Chemie*, by Paul Walden, 1952, 118 pp., paper covers, DM 12.60. A brief, chronological history of chemistry—from ancient times till the year 1950. The many literature references in the text distinguish this historical survey from many other tables of this type.

Verlag fuer Jugend und Volk, Vienna: *Praktische Elektrochemie*, by Viktor Gaertner, 1952, 512 pp., (204 ill.), DM 52. This review presents the fundamentals and the technology of electrochemistry. It was written primarily for people who have to do with batteries, electroplating, galvanoplastic, electrometallurgy, electrolysis, electrothermic and oxidation processes, which are used industrially. • *Die Untersuchung und Richtigstellung galvanotechnischer Baeder und die Erprobung galvanotechnischer Metallniederschlaege*, by A. Wogrinz und J. Schmelik, 1950, 107 pp., (33 ill., 5 tables), paper covers, DM 11.70. Written for practical use, this pamphlet tells how to check and correct the various galvanotechnic baths (Cr, Ni, Zn, Cu, Ag, Au, Cd, etc.) and also gives testing methods for the quality of electroplated surfaces.

Verlagsgesellschaft Rudolf Mueller, Oldenburg: *Likoerfabrikation auf kaltem Wege*, by Fehr-Norrenberg, 7th ed., 125 pp., DM 6.90. The introductory chapters of the booklet contain general information about alcohol, essential oils, sweetening, coloring, aging, mixing, etc. They are followed by a compilation of proved formulas for the simple production of liqueurs without the use of heat.

Theodor Steinkopff, Dresden-A 53: *Chemische Konservierung von Lebensmitteln*, by Paul Hirsch, 1952, 150 pp., DM 2.16. Chemical methods for the conservation of foodstuffs are discussed, including various chemical preservatives—from the old benzoic and salicylic acids to the newest antibiotics. A number of suggestions for research in the interest of improving the conservative methods of foodstuff conservation are made. • *Die Aminosaeuren und die Bedeutung fuer die Ernährung und Therapie*, by H. W. Bansi und L. Ludwig, 1951, 96 pp., paper covers, DM 1.80. A treatise on the amino acids and their importance for nutrition and therapy. With many tables and literature references. • *Lehrbuch der organischen Chemie*, by Wolfgang Langenbeck, 12 ed., 548 pp., DM 3.60. The 8th edition of this well-established textbook of organic chemistry was reviewed in the September, 1950, issue of THE CHEMIST. Only minor changes have been made in the new edition.

## Information

"Unloading Flammable Liquids From Tank Cars." Manual Sheet TC-4. \$0.20. Manufacturing Chemists Association, Inc., 246 Woodward Building, Washington 5, D.C.

"How to Control Cotton Insects with Sprays." Bulletin. Pennsalt Chemicals, Agricultural Chemicals Dept., 100 Widener Building, Philadelphia 7, Pa.

"Microscopical Dyeing Phenomena with the Microdyoscope." Bulletin. Calco Technical Bulletin No. 825. American Cyanamid Co., Calco Chemical Division, Bound Brook, N. J.

"Improved Heavy-Duty Dehumidifier." Information. Dryomatic Corp., 812 North Fairfax St., Alexandria, Va.

"The GS pouring spout and tilter." Information. General Scientific Equipment Co., 1412 Packard Building, Philadelphia 2, Pa.

"Traffic Concrete—A Study in Specialization." Bulletin. Flash-Stone Co., Inc., 3723 Pulaski Ave., Philadelphia 40, Pa.

"Let's Look It Up." Catalog. Reinhold Publishing Corp., 330 West 42nd St., New York 36, N. Y.

"Witcombings" House Organ. Witco Chemical Co., 295 Madison Ave., New York 17, N. Y.

"Food and Container Problems of the Armed Forces." Booklet. Research and Development Associates, Food and Container Institute, Inc., 1849 W. Pershing Road, Chicago 9, Ill.

"Automatic bin level indicators." Catalog. The Bin-Dicator Company, 13946-42 Kercheval Ave., Detroit 15, Mich.

"Hazegage Combustion Indicator." Bulletin 801. Ess Instrument Co., Bergenfield, N. J.

"New Ohaus Triple Beam Balance." Information. Ohaus Scale Corp., 1050 Commerce Ave., Union, N. J.

## THE LENTO PRESS

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"Multi-Purpose Compression Tester." Information. Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa.

"Magna-Crete", Magnesium cement flooring." Information. Flash-Stone Co., Inc., 3723 Pulaski Ave., Philadelphia 40, Pa.

"Pentahydrate form of sodium sulfide." Information. J. T. Baker Chemical Co., Phillipsburg, N. J.

"New High Speed Vacuum Pump." Information. Central Scientific Co., 1700 Irving Park Road, Chicago 13, Ill.

"Powerstat Variable Transformer Type 10." Bulletin. The Superior Electric Company, Bristol, Conn.

"Synthetic Waxes by Glyco." Catalog. Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y.

"What's a Silicone?" Booklet. Dow Corning Corp., Midland, Mich.

"New ignition improver for diesel fuel." Bulletin. Ethyl Corporation, 100 Park Ave., New York 17, N. Y.

"Take A Good Look At Thanite." Booklet. Hercules Powder Co., Wilmington, Del.

"Instruments for Spectrochemical Analysis." Catalog. Jarrell-Ash Co., 165 Newbury St., Boston 16, Mass.

"Cenco-Lerner Lab-Jack." Information. Central Scientific Co., 1700 Irving Park Road, Chicago 13, Ill.

"Royalton Press-O-Matic Burette." Information. Meyer Scientific Supply Co., Inc., 211-15 North 8th St., Brooklyn 11, N. Y.

"MSA Cleaner-Sanitizer." Bulletin No. CM-18. Mine Safety Appliances Co., Brad-dock, Thomas and Meade Streets, Pitts-burgh 8, Pa.

"Remington Rand Griscombe Portable Reader for 16mm. and 35mm. microfilm. Bulletin F263. Remington Rand, Inc., 315 Fourth Avenue, New York 10, N. Y.

"The History and Development of Fer-rolum Lead Clad Steel and Cupralum Clad Copper." Booklet. Research Depart-ment, Knapp Mills, Inc., 23-15 Borden Ave., Long Island City, N. Y.

"Progress in Peroxides." Bulletin No. 36. Buffalo Electro-Chemical Co., Inc., Station B, Buffalo 7, N. Y.

"The Steel Castings Industry." Book-let. Steel Founders' Society of America, 920 Midland Building, Cleveland 15, Ohio.

"How to Improve Engineering-Management Communications." Executive Re-search Survey Number One. \$2.00 per copy. National Society of Professional En-gineers, 1121 15th St., N.W., Washing-ton 5, D. C.

"Varicell D-C Power Supply." Bulletin V1051. The Superior Electric Company, Bristol, Conn.

"Iolyte Polyester Laminated Sheets." In-formation. Industrial Organics Corpora-tion, 59-31 54th St., Maspeth 78, New York.

"Emersol 240 Vegetable Elaine." Bulle-tin No. 37. Emery Industries, Inc., Dept. 5, Carew Tower, Cincinnati 2, Ohio.

"Tufclad, Chemical Porcelain armored with fiberglass-reinforced plastic." Infor-mation. Lapp Insulator Co., Inc., Le Roy, N. Y.

"Condensed Scale Catalog No. 11." Howe Scale Co., Rutland, Vermont.

"What's New for the Laboratory." Cata-log supplement. Scientific Glass Appa-ratus Co., Inc., Bloomfield, N. J.

"Chemical Injector Pump Model MSM 5001." Information. Textsteam Corpora-tion, Dept. 26, 320 Hughes St., Houston 11, Texas.

"Reinflastics, new laminate." Brochure. Russell Reinforced Plastics Corp., 45 West John St., Hicksville, N. Y.

"Colormaster Differential Colorimeter." Information. Manufacturers Engineering & Equipment Corp., Hatboro, Pa.

"Oxidation of Vat Dyes on Cotton and Synthetics with Hydrogen Peroxide." Bul-letin No. 38. Research and Development Dept., Buffalo Electro-Chemical Com-pany, Station B, Buffalo 7, N. Y.

"The new Fisher 'Powerhouse' Power Pack." Information. Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa.

"Acrawax C Beads, high melting point synthetic wax." Information. Glyco Pro-ducts Co., Inc., 26 Court St., Brooklyn 2, N. Y.

"New Prufcoat General Catalog." Pruf-coat Laboratories, Inc., 50 East 42nd St., New York 17, N. Y.

"Properties and Essential Information for Safe Handling of Ammonium Di-chromite." Chemical Safety Data Sheet SD-45. \$0.25. Manufacturing Chemists Association, Inc., 246 Woodward Build-ing, Washington 5, D. C.

"New Air Conditioning Smoke Control Bulletin." Ess Instrument Company, 50 South Washington Ave., Bergenfield, N. J.

"Report on a Survey of the Cost of Absenteeism." Booklet. Benson Labora-tories, Inc. Bessemer Building, Pittsburgh 22, Pa.

"Insect Control on Crops, Shrubs, and Trees with Lindane." Bulletin. Pennsalt Chemicals, 1000 Widener Bldg., Philadel-phia 7, Pa.

"Lapp Pulsafeeder for Controlled Vol-ume Pumping." Bulletin No. 300. Lapp Insulator Co., LeRoy, N. Y.

**Annual Book Award:** Established by R. S. Aries and Associates for the first and second best books in the field of economics of the chemical process industries. Its purpose is to encourage chemists, chemical engineers, economists and chemical executives who are experts on economic aspects of the industry to put their knowledge in print.

The first prize is a gold statuette and the second prize a silver statuette. Advance royalties of \$1,500 will be paid to the winner of the first award, and \$500 to the winner of the second award. The first presentation will be in September 1953. Entries may be submitted through July 1, 1953.

The winning manuscripts will be published by Chemonomics, Inc., an affiliate of R. S. Aries & Associates. The book must have a minimum length of 30,000 words and must be written especially for the contest. Non-winning manuscripts may be published by Chemonomics on standard royalty terms if the author and publisher agree. Entry forms may be obtained from Chemonomics, 400 Madison Ave., New York 17, N.Y. Manuscripts should be addressed to the publishers, and authors should retain carbon copies.


The judges will be headed by Prof. David D. B. Hertz of Columbia University and Prof. John Happel, F.A.I.C., of New York University.

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**Appointed:** Dr. Ernest Livingston, F.A.I.C., as deputy chairman of the Chemistry Department, and Dr. Robert Ginell, F.A.I.C., as deputy chairman of the Graduate Division of the Chemistry Department, of Brooklyn College, Brooklyn 10, N. Y.

**Elected:** Dr. E. W. Reid, F.A.I.C. as a director of American Locomotive Company, Schnectady 5, N.Y. Dr. Reid is president of the Corn Products Refining Company and the recipient of the 1951 Chemical Industry Medal.

**Established:** Goodrich - Gulf Chemicals, Inc., by Gulf Oil Corporation and the B. F. Goodrich Company, for the purpose of exploring projects in the petrochemical field in which parent companies have strong complementary interests. A plant site is being obtained at Orange, Texas. The head office will be in Pittsburgh.

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**Elected:** Dr. Max E. Bretschger as president of Buffalo Electro-Chemical Co., Inc., to fill the vacancy created by the death of Charles A. Buerk. Dr. Bretschger was formerly vice-president.

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**Returned:** C. C. Concannon, F.A.I.C., and councilor-at-large of the AIC, from Europe where he was delegate from the United States to the third session of the Chemical Industries Committee, International Labor Organization, which met during September in Geneva, Switzerland. Mr. Concannon was chairman of the Working Party on the Classification and Labeling of Dangerous Substances, which recommended the adoption of five simple symbols for use in international trade: Explosive, Flammable, Toxic, Corrosive and Radioactive.

Mr. Concannon organized the Chemical Division in the Bureau of Foreign and Domestic Commerce in 1922. During his thirty years in Government, with some modification

in duties, such as recent responsibility for control of exports, he has been the Commerce Department's chemical chief, carrying out the original Hoover direction to "foster, promote and develop the chemical commerce and industry of the United States." Among his numerous foreign missions, he was chairman of the U. S. Delegation to the International Congress of Chemistry, Rome, 1938, and U. S. delegate to the Chemical Industries Committee, ILO, Geneva, 1950 and 1952. He also has been on loan from this government as advisor to the governments of Chile and Peru.

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**Announced:** By Central Scientific Company, Chicago, Ill., that the Mallinckrodt line of some 400 analytical reagents will be the principal brand of laboratory chemicals offered to its customers.

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**Branch Office:** Established by R. S. Aries & Associates, New York, N. Y., in Detroit. It will be headed by R. A. Willinganz, 15336 West Warren Ave., Dearborn, Michigan.

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**Represented:** One-hundred different industries at the British Industries Fair scheduled for London and Birmingham, England, April 27th to May 8th. Catalogs listing the exhibitors and products will be available without charge from British Consulates three months before the opening of the Fair.

**Resigning:** Dr. Gerald J. Leuck, F.A.I.C., technical director of Glyco Products Co., Inc., Natrium, West Virginia, to enter the consulting field. He has been appointed special research consultant for Glyco Products Co., Inc.

**Merger:** Of E. R. Squibb & Sons into Mathieson Chemical Corporation, approved by the shareholders of both corporations. This merger continues the policy of Thomas S. Nichols, president of Mathieson, and the board of directors for greater diversification of products and expanded development and research. E. R. Squibb & Sons will operate as a separate division of Mathieson.

**Announced:** By Dr. R. A. Shive, F.A.I.C., director of the Technical Service Pigment Department, Calco Chemical Division of American Cyanamid Company, Bound Brook, N. J., the appointment of L. A. Melsheimer, F.A.I.C., as manager of technical promotion of the Pigment Department. Mr. Melsheimer was formerly in charge of the Pigment Department Technical Service Laboratory.

**Meeting:** Of the Society for Applied Spectroscopy, January 6th, at Socony-Vacuum Training Center, 63 Park Row, New York, N.Y. Speaker: Dr. Frank Hochgesang, "Computation of Analytical Results."

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**To Spain:** Dr. Gustav Egloff, Hon. A.I.C., where he will address the Instituto del Combustible, Madrid, on "Present and Future Motor Fuels and Lubricants"; the Instituto "Alonso Barba" de Quimica, Madrid, on "Catalysis in Petroleum Refining"; La Laguna University, Tenerife (Canary Islands) on "The Evolution of Petroleum Refining Technology," and also oil and other groups in Spain on "Living off Petroleum." He will also visit the refinery of Compania Espanola de Petroleos (CEPSA) in Tenerife, where a Universal Oil Products Platforming unit is being installed, and the Caltex refinery at Carteghena. Dr. Egloff will return on the superliner "United States," January 24th, to arrive January 28th in New York.

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**New Plant:** To be erected by Oldbury Electro-Chemical Company on a site five miles south of Columbus, Mississippi, for the manufacture of sodium chlorate. Estimated cost: \$3,500,000. Production is scheduled for late 1953.

**New Position:** W. E. Santoro, F.A.I.C., is now head of the research division of The Monroe Sander Corporation of Long Island City, N. Y. He was formerly associated with the Standard-Toch Chemical Company of Staten Island, N. Y.

**Senior Consultant:** Dr. William L. Prager, who has retired as professor of organic chemistry at the College of the City of New York. Formerly head of the department of chemistry at the College, Dr. Prager has accepted the appointment of senior consultant to Herstein Laboratories, Inc., 128 Water Street, New York 5, N. Y.

**Acquired:** By Gallowhur Chemical Corporation, New York, N. Y., the plant formerly occupied by Steroid Laboratories, Grenville, P. Q., Canada. Gallowhur Chemicals of Canada, Ltd., has been organized to operate the Canadian plant. Grant McKenna is production manager of the new company and William Gray plant superintendent.

**Conference:** The Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy will be held at the William Penn Hotel, Pittsburgh, Pa., on March 2-6, 1953. The Program chairman is L. E. Pitzer, U.S. Steel Co., 525 Wm. Penn Place, Pittsburgh 30, Pa.

**Appointed:** Dr. Clinton W. MacMullen, F.A.I.C., as section chief in the Organic Chemicals Department of Olin Industries, Inc., New Haven, Conn. Dr. MacMullen was formerly technical director of Cowles Chemical Company of Cleveland, Ohio.

**Speaker:** Dr. Emil Ott, F.A.I.C., director of research for Hercules Powder Company, Wilmington, Del., who gave a "Review of Rosin Chemistry," illustrated with color slides, before the Toronto Section of the Chemical Institute of Canada, November 25th.

**Merged:** The two pharmaceutical divisions of Warner-Hudnut, Inc., consisting of William R. Warner, New York, N. Y., and Chilcott Laboratories of Morris Plains, N. J., into a new division to be known as Warner-Chilcott Laboratories.

**Announced:** By H. B. McClure, F.A.I.C., vice-president of Carbide and Carbon Chemicals Company, New York 17, N. Y., the return of Lester D. Berger, Jr., from the company's Atomic Energy Operations, Oak Ridge, to the New York offices as assistant product manager of the Fine Chemicals Division.

**Opened:** The new BECCO plant at Vancouver, Washington, to supply hydrogen peroxide to the West Coast.

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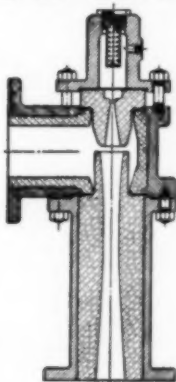
Protoveratrine, an extract of the green hellebore, according to Sibley W. Hoobler of the University of Michigan Medical School, can reduce high blood pressure for a period of six to eight hours without nausea and vomiting.

It is indeed fortunate for America that in the early days, we had freedom in every sense in which the word is important. There was freedom to become a merchant-mariner; freedom to start a business on the Brandywine; freedom of speech; freedom of worship. And we were free to retain ourselves the fruits of our efforts. For an imperfect humanity, that is perhaps the most important freedom of all, for that is the freedom that provides incentive. And only through man's struggles, whatever his motives, are those great things accomplished that make for national progress.

—C. H. GREENEWALT, F.A.I.C.

The median salary of all chemists, according to the National Scientific Register and the American Chemical Society, is \$5,500 per year, whereas that for chemists in education is \$4,900, that for government chemists is \$5,000 and that for chemists in industry is \$5,800.

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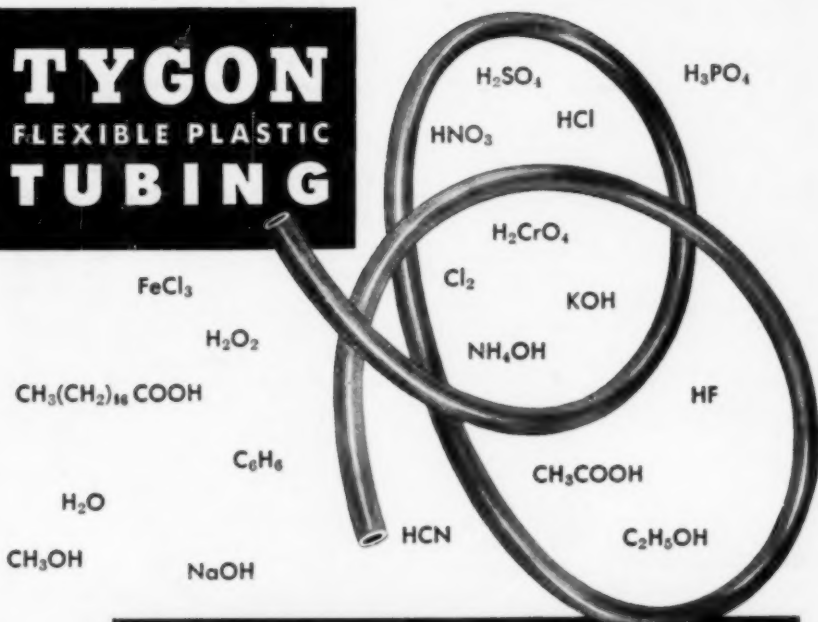
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